

## Aviation

College of Education

Department of Aviation

328 Armstrong Hall • 507-389-6116

Chair: Joel Stephenson

Nihad Daidzic, Joel Patrick McKinzie, Thomas Peterson

**Aviation Program Mission.** The mission of the Minnesota State Mankato Aviation program is to prepare principled professional aviation practitioners for responsible positions in the air transportation industry, including airline operations and management, corporate aviation, airport management, and government operations. The program aims to equip students to thrive in the rapidly changing and highly competitive fields of aviation and motivate them to engage in life long learning.

**Advising.** Aviation students will be assigned an aviation faculty advisor following an initial or transfer orientation session. Faculty advising appointments may be scheduled through Linda Winans, Administrative Assistant in the Aviation Department Office. Mymique Baxter, College of Education Student Relations Coordinator, is also available for general education, cultural diversity, major admission and program completion (application for graduation) advisement. Students may make appointments through the College of Education Academic Advisement Office (Armstrong Hall 117). On-site airport advising is also available and hours will be posted.

**Admission to Major.** Coordinator for Admission to Major, Mymique Baxter, 117 Armstrong Hall.

All students must submit an unofficial transcript or DARS report (available at the Campus Hub).

Students must meet the following requirements:

- a minimum of 32 earned semester credit hours.
- a minimum cumulative GPA of 2.00.

Students may enroll in 100 and 200 aviation coursework prior to admission to major.

### POLICIES/INFORMATION

**Flight Lab.** Flight lab completion requires evaluation by aviation faculty. Flight costs are determined on an hourly basis for aircraft and flight instruction. To obtain FAA certifications requires FAA exams which may require a fee.

**Transfer of college credit and credit for certificates and/or ratings.** The Minnesota State Mankato Department of Aviation bases its flight education philosophy in a four-year university degree. Consequently, students who have obtained flight certificates/ratings without earned college credit may not have satisfied the academic and flight requirements for the aviation major. Students must demonstrate that they have received the full breadth and depth of knowledge, skills, abilities, and attitudes consistent with an education received at Minnesota State Mankato. Once enrolled at Minnesota State Mankato, students are expected to complete all subsequent flight training within Minnesota State Mankato's aviation program.

**Transfer credits.** To satisfy aviation curriculum requirements, students with pilot certificates and ratings earned with college credit through a Council on Aviation Accreditation (CAA) accredited university may transfer those credits without demonstration of proficiency. College credits obtained through a non CAA accredited institution will be reviewed by the Department of Aviation to ensure the issuing institution follows policies and practices consistent with CAA accreditation standards. In the event credits do not transfer, students may be required to follow Credit for Experience procedures.

**Prior Experience.** Students entering Minnesota State Mankato with completed FAA certificates must register for and complete the requirements for the applicable ground school and flight lab courses. Prior flight experience will be evaluated by the faculty and may result in advanced standing in flight labs. Students are responsible for aircraft rental required for the evaluation.

**GPA Policy.** Admission to College of Education, 2.0 cumulative GPA.

**P/N Grading Policy.** Only elective and general education courses may be taken P/N, unless offered P/N only.

### AVIATION BS

#### General Education (Choose 4 credits)

AVIA 201 Theory of Flight (3)

#### Major Common Core

AVIA 101 World of Aviation (3)

AVIA 150 Private Pilot (4)

AVIA 334 Aviation Management (4)

AVIA 437 Aviation Safety (4)

AVIA 445 Aviation Human Factors (3)

#### Major Emphasis: Professional Flight Concentration

AVIA 151 Private Pilot Flight Lab (3)

AVIA 171 Multi-Engine Flight Lab (1)

AVIA 240 Instrument Pilot (3)

AVIA 241 Instrument Pilot Flight Lab (3)

AVIA 250 Commercial Pilot (3)

AVIA 251 Commercial Pilot Flight Lab (3)

AVIA 340 Flight Operations (3)

AVIA 360 Flight Instructor (3)

AVIA 361 Initial CFI-Airplane-Multiengine Flt Lab (1)

AVIA 362 Add-on CFI-A-Single Engine Flt Lab (1)

AVIA 363 CFI-Instrument Airplane (CFI-I) Flight Lab (1)

AVIA 436 Advanced Flight Operations (3)

AVIA 450 Professional Pilot Theory (3)

AVIA 451 Professional Pilot Flight Lab (2)

#### Restricted Electives (Choose 15 credits)

AVIA 202 Principles of Air Navigation (3)

AVIA 333 Airline Operations (3)

AVIA 336 Basic Aircraft Systems (3)

AVIA 337 Avionics (3)

AVIA 338 Advanced Aircraft Systems (3)

AVIA 339 Aerospace Propulsion (3)

AVIA 343 Airport Management (3)

AVIA 432 Aviation Law I (3)

AVIA 435 Aviation Law II (3)

AVIA 442 Fundamentals of Air Traffic Control (3)

AVIA 443 Airline Dispatch (3)

AVIA 455 Aircraft Performance (3)

AVIA 458 Aeromedical Factors (3)

AVIA 497 Aviation Internship (1-12)

AVIA 499 Individual Study in Aviation (1-6)

#### Major Emphasis: Aviation Management Concentration

ACCT 200 Financial Accounting (3)

AVIA 101 World of Aviation (3)

AVIA 343 Airport Management (3)

AVIA 360 Flight Instructor (3)

AVIA 361 Initial CFI-Airplane-Multiengine Flt Lab (1)

AVIA 362 Add-on CFI-A-Single Engine Flt Lab (1)

AVIA 363 CFI-Instrument Airplane (CFI-I) Flight Lab (1)

AVIA 432 Aviation Law I (3)

AVIA 435 Aviation Law II (3)

BLAW 200 Legal, Political, and Regulatory Environment of Business (3)

ECON 201 Principles of Macroeconomics (3)

## AVIATION

ECON	202	Principles of Microeconomics (3)
FINA	362	Business Finance (3)
MGMT	200	Introduction to MIS (3)
MGMT	330	Principles of Management (3)
MRKT	310	Principles of Marketing (3)

### Major Emphasis: Aeronautics Concentration

AVIA	101	World of Aviation (3)
AVIA	151	Private Pilot Flight Lab (3)
AVIA	171	Multi-Engine Flight Lab (1)
AVIA	202	Principles of Air Navigation (3)
AVIA	240	Instrument Pilot (3)
AVIA	241	Instrument Pilot Flight Lab (3)
AVIA	250	Commercial Pilot (3)
AVIA	251	Commercial Pilot Flight Lab (3)
AVIA	333	Airline Operations (3)
AVIA	336	Basic Aircraft Systems (3)
AVIA	337	Avionics (3)
AVIA	338	Aircraft Systems (3)
AVIA	339	Aerospace Propulsion (3)
AVIA	340	Flight Operations (3)
AVIA	343	Airport Management (3)
AVIA	360	Flight Instructor (3)
AVIA	361	Initial CFI-Airplane-Multiengine Flt Lab (1)
AVIA	362	Add-on CFI-A-Single Engine Flt Lab (1)
AVIA	363	CFI-Instrument Airplane (CFI-I) Flight Lab (1)
AVIA	432	Aviation Law I (3)
AVIA	435	Aviation Law II (3)
AVIA	436	Advanced Flight Operations (3)
AVIA	442	Fundamentals of Air Traffic Control (3)
AVIA	443	Airline Dispatch (3)
AVIA	450	Professional Pilot Theory (3)
AVIA	451	Professional Pilot Flight Lab (4)
AVIA	455	Aircraft Performance (3)
AVIA	458	Aeromedical Factors (3)
AVIA	497	Aviation Internship (1-12)
AVIA	499	Individual Study in Aviation (1-6)

### AERONAUTICS MINOR

An Aeronautics minor in Aviation is obtained after completing 16 required aviation core courses and 10 aviation electives. The minor provides fundamentals of the Aeronautical and Aviation sciences that may result in the candidate obtaining pilot certificates provided the required flight training is completed and all practical tests passed.

#### Minor Core

AVIA	101	World of Aviation (3)
AVIA	150	Private Pilot (4)
AVIA	437	Aviation Safety (4)

#### Required General Education (Choose 3 credits)

AVIA	201	Theory of Flight (3)
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#### Elective

A plan of study must be completed and approved by the Aviation Department.

#### Restricted Electives (Choose 9 credits)

AVIA	151	Private Pilot Flight Lab (3)
AVIA	240	Instrument Pilot (3)
AVIA	241	Instrument Pilot Flight Lab (3)
AVIA	250	Commercial Pilot (3)
AVIA	251	Commercial Pilot Flight Lab (3)
AVIA	333	Airline Operations (3)
AVIA	337	Avionics (3)
AVIA	343	Airport Management (3)
AVIA	432	Aviation Law I (3)
AVIA	435	Aviation Law II (3)

AVIA	436	Advanced Flight Operations (3)
AVIA	442	Fundamentals of Air Traffic Control (3)
AVIA	443	Airline Dispatch (3)
AVIA	445	Aviation Human Factors (3)

### PRIVATE FLIGHT MINOR

#### Minor Core

AVIA	101	World of Aviation (3)
AVIA	150	Private Pilot (4)
AVIA	437	Aviation Safety (4)

#### Restricted Electives (Choose 9 credits)

AVIA	151	Private Pilot Flight Lab (3)
AVIA	171	Multi-Engine Flight Lab (1)
AVIA	240	Instrument Pilot (3)
AVIA	241	Instrument Pilot Flight Lab (3)
AVIA	250	Commercial Pilot (3)
AVIA	251	Commercial Pilot Flight Lab (3)

### PROFESSIONAL FLIGHT MINOR

#### Minor Core

AVIA	101	World of Aviation (3)
AVIA	150	Private Pilot (4)
AVIA	437	Aviation Safety (4)

#### Required Elective (Choose 22 credits)

AVIA	151	Private Pilot Flight Lab (3)
AVIA	171	Multi-Engine Flight Lab (1)
AVIA	240	Instrument Pilot (3)
AVIA	241	Instrument Pilot Flight Lab (3)
AVIA	250	Commercial Pilot (3)
AVIA	251	Commercial Pilot Flight Lab (3)
AVIA	340	Flight Operations (3)
AVIA	436	Advanced Flight Operations (3)

### PROFESSIONAL PILOT CERTIFICATE (CERT)

Note: This certificate program is not currently accepting students.

#### Certificate Core

AVIA	150	Private Pilot (4)
AVIA	201	Theory of Flight (3)
AVIA	202	Principles of Air Navigation (3)
AVIA	240	Instrument Pilot (3)
AVIA	250	Commercial Pilot (3)
GEOG	217	Weather (3)
GEOG	218	Weather Laboratory (1)

#### Certificate Restricted Electives

CHOOSE 2 CLUSTER:

Helicopter or Airplane

Select one group, either the helicopter option (12 credits) or the airplane option (10 credits).

(Choose 12 credits)

AVIA	152	Private Pilot Helicopter Flight Lab (3)
AVIA	242	Instrumental Pilot Helicopter Flight Lab (3)
AVIA	252	Commercial Pilot Helicopter Flight Lab (3)
AVIA	270	Helicopter Pilot (3)

(Choose 10 credits)

AVIA	151	Private Pilot Flight Lab (3)
AVIA	251	Commercial Pilot Flight Lab (3)
AVIA	261	Instrument Pilot Flight Lab (3)
AVIA	371	Multi-Engine Flight Lab (1)

### Domestic or International Students

Pick one option. The first is intended for domestic students, the second offers courses in English for Aviation for non-native English speakers. Advisor approval is necessary for your selection.

(Choose 6 credits)

AVIA 101 World of Aviation (3)

(Choose 8 credits)

ENG 207 Special Topics in ESL (1-4)

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### COURSE DESCRIPTIONS

#### **AVIA 101 (3) World of Aviation**

A study of how aviation fits into our modern world, relation to business, and contribution to the economy. Study of aviation as a visible alternative in transportation.

Fall, Spring

#### **AVIA 150 (4) Private Pilot**

A study of basic aeronautical knowledge including principals of flight, aerodynamics, aviation regulations, weather, visual and instrument navigation, and emergencies. The course meets, but is not limited to, FAR part 61.105 (a, 1-6). Satisfactory completion of this course may result in an endorsement for the FAA Private Pilot written exam.

Fall, Spring

#### **AVIA 151 (3) Private Pilot Flight Lab**

Provides beginning flight student with the in-flight requirements needed to obtain the FAA Private Pilot's Certificate.

Fall, Spring

#### **AVIA 152 (3) Private Pilot Helicopter Flight Lab**

Provides initial flight student with the in-flight training requirements needed to obtain the FAA private Pilot Helicopter Certificate.

On-Demand

#### **AVIA 171 (1) Multi-Engine Flight Lab**

Prepares advanced flight student with the in-flight requirements needed to obtain the FAA Multi-Engine Pilot rating.

Pre: AVIA 151, or equivalent

Fall, Spring

#### **AVIA 201 (3) Theory of Flight**

A study of physics and aerodynamic principals of flight and propulsion systems. The nature of aerodynamic forces are explained. Flight principals of lighter-than-Air, airplane, glider, rotocraft and powered lift are covered in detail.

Pre: AVIA 101, AVIA 150

Fall, Spring

#### **AVIA 202 (3) Principles of Air Navigation**

A study of fundamental air navigation principles and how it is applied to flight. Pilotage and dead reckoning. Great circle navigation. Charts and conformal projects. Celestial navigation systems and their operations and use.

Pre: AVIA 150

Spring

#### **AVIA 240 (3) Instrument Pilot**

A study of the aeronautical knowledge including aviation regulations, weather, instrument navigation, and instrument emergencies. The course meets, but is not limited to, FAR part 61.65 (b, 1-4). Satisfactory completion of this course may result in an endorsement for the FAA Instrument Pilot written exam.

Pre: AVIA 150, or equivalent

Fall, Spring

#### **AVIA 241 (3) Instrument Pilot Flight Lab**

Prepares advanced flight students with the in-flight requirements needed to obtain the FAA Instrument Pilot rating.

Pre: AVIA 151, or equivalent

Fall, Spring

#### **AVIA 242 (3) Instrument Pilot Helicopter Flight Lab**

Prepares advanced flight students with the in-flight requirements needed to obtain the FAA Instrument Pilot Helicopter rating.

Pre: AVIA 152

On-Demand

#### **AVIA 250 (3) Commercial Pilot**

A study of advanced aeronautical knowledge, including aerodynamics, aviation regulations, weather, visual and instrument navigation, and emergencies. The course meets, but is not limited to, FAR part 61.125 (a, 1-4). Satisfactory completion of this course may result in an endorsement for the FAA Commercial Pilot written exam.

Pre: AVIA 150, or equivalent

Fall, Spring

#### **AVIA 251 (3) Commercial Pilot Flight Lab**

Prepares advanced flight students with the in-flight requirements needed to obtain the FAA Commercial Pilot's Certificate.

Pre: AVIA 151, or equivalent

Fall, Spring

#### **AVIA 252 (3) Commercial Pilot Helicopter Flight Lab**

Prepares advanced flight students with the in-flight requirements needed to obtain the FAA Commercial Pilot Helicopter Certificate.

Pre: AVIA 152, AVIA 242

On-Demand

#### **AVIA 270 (3) Helicopter Pilot**

Study of Helicopter theory to meet FAA part 141 certification requirements for helicopter.

Pre: AVIA 150, AVIA 250, AVIA 260

On-Demand

#### **AVIA 275 (3) Helicopter Flight Theory**

This course covers all the knowledge areas required for the FAA helicopter private, instrument and commercial pilot certification at a deeper and more academic level.

Variable

#### **AVIA 333 (3) Airline Operations**

Designed to cover the complex area of operation techniques and problems confronting the airlines today. Entails a study of marketing research, passenger trends, feasibility route studies, etc.

Fall, Spring

#### **AVIA 334 (4) Aviation Management**

Provides an understanding of management and financial techniques related to aviation businesses. Generally accepted and proven business techniques and proven business techniques are applied to the aviation setting.

Fall, Spring

#### **AVIA 336 (3) Basic Aircraft Systems**

Aircraft systems for light and medium category general aviation aircraft, includes the study of structure, control, electrical, fuel, environmental, landing gear, and engine systems. Examples of general aircraft category aircraft systems will be discussed from the pilots perspective.

Fall

#### **AVIA 337 (3) Avionics**

Principles of Avionics is an expanded course on the theory and Applications of Aviation Electronics for future pilots and students of aviation and aeronautics. The course highlights modern synthetic displays, navigation, automatic flight control, FMS, and other essential aircraft equipment.

Variable

## **AVIA 338 (3) Advanced Aircraft Systems**

Hydraulic, pneumatic, electrical, pressurization, environmental, and other systems for large-transport category aircraft are covered. Also turbine engines, primary and secondary flight controls, and miscellaneous important systems are examined. Examples of systems in large transport-category jets will be discussed from the pilot operational perspective.

## **AVIA 339 (3) Aerospace Propulsion**

The course provides basic principles of operation and components description of the traditional and modern propulsion systems used in atmospheric and space transportation vehicles. Reciprocating engines with propellers, turbine jet engines, and chemical rockets are covered.

Spring

## **AVIA 340 (3) Flight Operations**

Introduces students to airline training, regulations, and flight management systems (FMS). Students will develop an understanding of airline operations as they experience an FAA Part 121 style basic indoctrination. Students will be trained on procedures, requirements, and limitations for airline operations through all phases of flight and ground in a simulated Advanced Qualifications Program (AQP) style course. Students will also develop technical and procedural knowledge of FMS.

Fall, Spring

## **AVIA 343 (3) Airport Management**

Course provides students with an overview of airport management. Studies include the day-to-day operations of air carrier and general aviation airports as well as planning, design, construction, finance and public relations associated with airport management. Students are exposed to many career opportunities in this area. The course includes a case study of the Minneapolis/St. Paul metropolitan area airport system and several site visits.

Spring

## **AVIA 360 (3) Flight Instructor**

A study of the fundamentals of instruction including the learning process, effective teaching evaluation, course development, lesson planning, and instructing techniques. The course meets, but is not limited to, FAR part 61.187 (a, 1-6). Satisfactory completion of this course may result in an endorsement for the FOI and CFI-A written exam.

Pre: AVIA 150, AVIA 250, AVIA 260

Fall, Spring

## **AVIA 361 (1) Initial CFI-Airplane-Multiengine Flt Lab**

Prepares advanced flight students for the in-flight requirements needed to obtain the FAA Multi-Engine Flight Instructor's Certificate.

Pre: AVIA 251 and AVIA 241, or equivalent

Fall, Spring

## **AVIA 362 (1) Add-on CFI-A-Single Engine Flt Lab**

Prepares advanced flight students with the in-flight requirements needed to obtain the FAA Certified Flight Instructor's Certificate.

Pre: AVIA 251 and AVIA 241, or equivalent

Fall, Spring

## **AVIA 363 (1) CFI-Instrument Airplane (CFI-I) Flight Lab**

Prepares advanced flight students with the in-flight requirements needed to obtain the FAA Instrument Flight Instructor's Certificate.

Pre: AVIA 251 and AVIA 241, or equivalent

Fall, Spring

## **AVIA 383 (1) Flight Instructor Helicopter Flight Lab**

Prepares advanced flight students with the in-flight requirements needed to obtain the FAA Certified Flight Instructor Helicopter Certificate.

Pre: AVIA 252

On-Demand

## **AVIA 392 (1) Instrument Instructor Helicopter Flight Lab**

Prepares advanced flight students with the in-flight requirements needed to obtain the FAA Instrument Helicopter Flight Instructor Certificate.

Pre: AVIA 242, AVIA 252

On-Demand

## **AVIA 432 (3) Aviation Law I**

To instruct the student relative to legal implications of aircraft ownership, leases, rentals, and overall aircraft operation. Emphasis is placed on the understanding of liability and negligence from the operator and pilot standpoints.

Spring

## **AVIA 435 (3) Aviation Law II**

This course will take an in-depth look at several legal topics that touch the aviation industry. The course will use the case study method to look at several aviation-related cases, including commercial airline accidents, pilot certificate actions, airline security violation cases, international aviation law, and several other current legal matters that involve the airline industry.

Pre: AVIA 432

Spring

## **AVIA 436 (3) Advanced Flight Operations**

Introduces advanced professional flight students to FAR Part 121 style standardized flight training in a regional jet. Course will include aircraft systems, procedures training, and techniques used in high performance turbine aircraft. Emphasis on standard operating procedures (SOP), crew resource management (CRM), and line oriented flight training (LOFT).

Pre: AVIA 340

## **AVIA 437 (4) Aviation Safety**

The understanding and implementation of safe operating procedures. Assists the student in arriving at proper decisions related to periods of stress when operating as pilot in command. Various FAA regulations and standard and safe operating procedures are also discussed.

Fall

## **AVIA 442 (3) Fundamentals of Air Traffic Control**

To provide the student with the basic knowledge of ATC as a career and the fundamentals necessary for FAA certification.

Fall

## **AVIA 443 (3) Airline Dispatch**

Introduces the workings of the complex system of air control in the US and abroad. Covers such subjects as radio communications, airspace classification, radar control, and operation as well as aircraft separation. Looks at present and future air traffic control systems.

Spring

## **AVIA 445 (3) Aviation Human Factors**

A study of various techniques designed to enhance management and leadership methods. Emphasizes decision-making and judgment skills as well as methods to improve effective communication and skills to develop a productive work environment for flight crew and other airline personnel.

Fall

## **AVIA 450 (3) Professional Pilot Theory**

This course is designed to develop students technical understanding of information and knowledge required for Air Transport Pilots. Students will participate in a capstone research project and present their findings in a research paper and oral presentation. Course completion requirements will include preparation for the FAA ATP written exam.

Pre: AVIA 250, AVIA 260

Fall

## **AVIA 451 (4) Professional Pilot Flight Lab**

Prepares students who desire careers as professional pilots. Emphasizes complete ground tutoring and flight instruction relating to instrument maneuvers, SOP's, regulation interpretation, pilot discipline, and professional procedures. Crew resource management, LOFT, and turbine-transition flights in an advanced jet flight simulator are used.

Pre: AVIA 241, AVIA 251

Fall, Spring

## AVIA 455 (3) Aircraft Performance

The fundamental principles and calculation of the performance in various phases of flight: takeoff and land, climb and descent performance, maximum-range and maximum-endurance cruise, single-engine performance in multi-engine aircraft, standard atmosphere and basic subsonic and supersonic aerodynamics is covered.  
Pre: AVIA 201  
Variable

## AVIA 458 (3) Aeromedical Factors

Covers aeromedical factors that are essential for high-altitude flying aircraft. Hypoxia, hyperventilation, dysbarism, basic gas laws. Armstrong line, vision in flight, day and night. Pressurization systems, pressurized suits, danger of loss of cabin pressure, future HSCT and LEO commercial flights.  
Variable

## AVIA 490 (1-10) Aviation Workshop

Variable

## AVIA 497 (1-12) Aviation Internship

Supervised experience in business, industry, state or federal institutions.  
Fall, Spring

## AVIA 499 (1-6) Individual Study in Aviation

Allows the student an individual course of study on an aviation topic to be arranged with the department. This course will be writing intense.  
Fall, Spring

# Biochemistry

*College of Science, Engineering and Technology*  
*Department of Chemistry & Geology*  
241 Ford Hall • 507-389-1963

Chair: Mary Hadley

Lyudmyla Ardanova, Brian Groh, Michael J. Lusch, Marie K. Pomije, Jeffrey R. Pribyl, Danae Quirk Dorr, James Rife, Theresa Salerno, Daniel Swart, John D. Thoemke, Trent Vorlicek

Biochemistry is a discipline which encompasses both biology and chemistry. This rapidly expanding science focuses on the study of the molecular aspects of living organisms. The tools and concepts of biochemistry are important as a foundation for careers in many areas of research and in medicine. Students considering a BA or BS degree in biochemistry should consult a biochemistry advisor for specific information regarding the program. This major is appropriate for students in pre-professional programs such as pre-dental, pre-medical, and pre-pharmacy programs.

**Admission to Major.** Admission to a program is necessary before a student can enroll in 300- and 400-level courses. To be eligible for admission to the biochemistry program a student must have declared biochemistry as a first major, completed 32 credits, including BIOL 105 and BIOL 106 as well as CHEM 201 and CHEM 202 and achieved a minimum grade point average of 2.0. Students should also have an assigned biochemistry advisor with whom they have discussed the program. Applications for admission to the biochemistry program are available in the department office.

## POLICIES/INFORMATION

The first year of coursework for biochemistry majors should include two semesters of chemistry (CHEM 201, CHEM 202), MATH and at least one semester of Biology (BIOL 105). Organic Chemistry should be taken during the second year.

**GPA Policy.** Students obtaining a major in biochemistry must maintain an overall GPA of 2.2 in all courses required for their selected program with no more than 4 credits of "D" work in chemistry or biochemistry courses.

Students must meet a residency requirement. This means that all students who wish to receive either the Biochemistry BA or the Biochemistry BS from Minnesota State Mankato must complete the biochemistry sequence which consists of CHEM 460, CHEM 461, CHEM 465 and CHEM 466 at Minnesota State Mankato. It is important that this sequence be taken during the third (junior) year for all majors.

Students who complete the requirements for the Biochemistry BS must submit a comprehensive research report in conjunction with completion of CHEM 498. Students are encouraged to contact Professors Rife and Salerno for details regarding the research report prior to enrolling in CHEM 498.

**P/N Grading Policy.** Courses leading to a major or minor in chemistry or biochemistry may not be taken on a P/N basis, except where P/N grading is mandatory.

The department is recognized by the American Chemical Society and offers a BS (Chemistry) major that is approved by that organization. The BS Biochemistry program follows the ASBMB recommended curriculum for a biochemistry and molecular biology undergraduate major. Anyone considering a biochemistry major should choose a biochemist as an advisor and consult that advisor often throughout the course of study.

## BIOCHEMISTRY BA

### Required General Education

BIOL	105	General Biology I (4)
CHEM	201	General Chemistry I (5)

### Major Common Core

BIOL	106	General Biology II (4)
BIOL	211	Genetics (4)
BIOL	270	Microbiology (4)
BIOL	479	Molecular Biology (4)
CHEM	202	General Chemistry II (5)
CHEM	305	Analytical Chemistry (4)
CHEM	320	Organic Chemistry I (5)
CHEM	321	Organic Chemistry II (3)
CHEM	331	Organic Chemistry II Lab (1)
CHEM	460	Biochemistry I (3)
CHEM	461	Biochemistry II (3)
CHEM	465	Biochemical Techniques I (1)
CHEM	466	Biochemical Techniques II (2)
CHEM	474	Chromatography (2)
CHEM	495	Senior Seminar (1)

### Major Restricted Electives

BIOL upper division electives  
(Choose 9 credits)  
BIOL 300-499 BIOL electives require approval from a Biochemistry advisor

### Other Graduation Requirements

Choose at least 2 additional upper division credits to meet graduation requirements.

**Required for Bachelor of Arts (BA) degree ONLY:** Language (8 credits)

**Required Minor:** None.

## BIOCHEMISTRY BS

### Required General Education

BIOL	105	General Biology I (4)
CHEM	201	General Chemistry I (5)

MATH courses (Choose 7-8 credits)

Choose 2 of the following courses. Note that GE-4 requires 1 course so the remaining credits may be considered restricted elective credits.

MATH	121	Calculus I (4)
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